CANOGA™ | Traffic Sensing System

Canoga™ 944 Traffic Monitoring Card
Canoga™ Traffic Monitoring Card Configuration Software (TMC-CS)

Canoga™ 944 Traffic Monitoring Card

DESCRIPTION

The Canoga™ Traffic Sensing System is a component system that includes the Canoga™ 944 Traffic Monitoring Card, designed for use with Canoga™ 701 Microloop™ Sensors and Canoga™ 702 Non-invasive Microloop™ Sensors. Canoga 944 measures individual vehicle speed and length with industry-leading accuracy and reliability; classifies traffic according to speed and vehicle length; and measures vehicle presence, average traffic speed, vehicle count and roadway occupancy. Canoga 944 is designed for North American cabinet standards (NEMA compatible).

Canoga 944 is configured with Canoga™ Traffic Monitoring Card Configuration Software (TMC-CS). The Canoga TMC-CS is required to select the vehicle-sensing algorithm for the traffic monitoring cards used with Canoga Microloop sensors or inductive loops. Canoga 944 is readily configured for optimal accuracy. Card status and operation can be monitored remotely and in real-time.

TRAFFIC SENSING

Canoga 944 uses input from two Canoga 701 or 702 Microloop assemblies installed in a traffic lane and separated by at least 8.2 feet (2.50 m) and generally separated by no more than 20 feet (6.1 m). Each Canoga Microloop assembly is connected to one channel of a channel pair.

REAL-TIME TRAFFIC DATA

Canoga 944 makes available two types of information for real-time traffic monitoring:

- Individual vehicle speed and length
- Mean speed, count and occupancy collected during consecutive, user-defined time periods

This information is stored in a circular, rotating, volatile memory buffer sized to hold the last 15 minutes or more of data. The buffer permits rapid polling of Canoga 944 without loss of data should communication errors occur.

FEATURES

User-defined Real-time Traffic Events

The user can monitor real-time events based on vehicle-specific, user-defined vehicle speed and length conditions. For example, a condition may be defined as vehicle speed greater than a defined limit and vehicle length longer than a defined length. When the condition occurs, Canoga 944 may turn on an optional solid-state switching output for a user-defined length of time and store the event occurrence in the event history log.

Historical Traffic Data

Canoga 944 has 16KB of built-in memory that can be extended to 64KB with the Canoga™ 848 Memory Module. This memory is used to store historical traffic information collected in consecutive, user-defined time periods:

- Mean speed, count and occupancy
- Vehicles classified by speed
- Vehicles classified by length
- Vehicles classified by length and speed

Canoga™ 944 Traffic Monitoring Card senses vehicle presence with industry-leading accurracy.

About GTT

Global Traffic Technologies, LLC (GTT), formed in 2007 from 3M's pioneering Intelligent Transportation Systems business, is the manufacturer of Opticom™ priority control systems and Canoga™ traffic sensing systems.

SOLUTIONS FOR:

Traffic

FEATURES (CONTINUED)

Operating Characteristics
Canoga 944 has built-in protection against lightning-induced and other transients. User-programmed settings and data collected by the traffic monitoring card are stored in non-volatile memory.

Communications
Two independent serial ports are available for local or remote communication:

- Front-panel multi-drop TIA232 (RS232) port
- Back-panel transmit/receive pin connectors for multi-drop TIA485 (RS485) communication

Canoga™ Traffic Monitoring Card Configuration Software (TMC-CS) uses the ports for local or remote configuration of Canoga 944.

Synchronization
Each Canoga traffic monitoring card is capable of synchronizing the sampling of its sensors to other traffic monitoring cards of the same make and model within the same card rack. One card is set as synchronization leader while all other cards in the group are set as synchronization followers.

Sensitivity and Tuning Range
16 software-configurable sensitivity settings are available per channel (eight "Pulse" modes, seven "Presence" modes and an "Off" mode) over a tuning range from 20 to 2,500 microhenries.

Frequency Settings
Four frequencies are available per channel.

Remote Reset
External input allows a remote reset of the Canoga traffic monitoring card. When the input voltage on pin C is pulled below 6 VDC for more than 17 milliseconds, the card resets all active channels and establishes a new reference for each "On" channel within four seconds.

Power On/Off Switch (Reset Switch)
The "On/Off" switch allows the user to turn off or reset the Canoga traffic monitoring card.

Internal Diagnostics
Canoga 944 identifies and stores the type of sensor fault and time of occurrence.

Channel-by-Channel Programming
All parameters for accurate sensing of all licensed vehicles are programmable separately for each channel, including sensitivity, background adapt rate, recovery method, wash delay time and wash adapt rate.

Detect and Fault LED Indicators
Green Detect LED indicators display the status of the channel output and its timing.

- "On" during detection indicates that a vehicle is being detected.
- "Flash" indicates that the direction of the vehicle has been detected, when the traffic monitoring card is programmed for directional detection, or that a real-time event has been detected.
- Continuous "On" indicates a fault condition exists.

Red Fault LED indicators display coded messages of current or historical sensor fault status and failure type.

- One long ("On" for one second) and one short pulse indicate a current "Open" condition.
- One long and two short pulses indicate a current "Shorted" condition.
- One long and three short pulses indicate current excess inductance change ($\Delta L \geq 25\%$).
- A delayed ("On" for five seconds) pulse followed by the flash code for a fault indicates historical fault status.

Power LED Indicator
Power LED indicator displays when power is applied to the Canoga traffic monitoring card.

Communication Port Activity

- Rapidly flashing LED indicates data transmission.
- COM 1 LED indicates front port communication.
- COM 2 LED indicates rear port communication.
- A 1-Hz flash by either LED indicates synchronization faults.

ENVIRONMENTAL

- Temperature: -29° F (-34° C) to +165° F (+74° C)
- Humidity: 5% to 95% (non-condensing)
- Electrical: 10.8 VDC to 37.8 VDC

  ≤ 50 milliamperes/channel at 24 VDC

  110 milliamperes/unit typical at 12 VDC

  55 milliamperes/unit typical at 24 VDC

PHYSICAL DIMENSIONS

- Net Weight: 7.5 oz. (213 g)
- Width: 1.13 in. (2.87 cm)
- Height PC board: 4.5 in. (11.43 cm)

  Face plate: 4.5 in. (11.43 cm)
- Depth: 7.1 in. plus .55 in. for handle (18 cm plus 1.4 cm for handle)

Canoga™ Traffic Monitoring Card Configuration Software (TMC-CS)

DESCRIPTION

Canoga TMC-CS is a matched component of the Canoga™ Traffic Sensing System. It uses communication ports to access Canoga 944 to read and change the configuration, monitor operation, identify and verify faults, monitor traffic in real-time and retrieve historical traffic and vehicle classification data.

SENSING PERFORMANCE CONFIGURATION

Canoga TMC-CS is used to completely configure Canoga 944 using the front TIA232 serial port.

Configuration of Sensing Parameters/Channel

- Canoga™ Microloop™ Sensor parameters
- Inductive loop parameters
- Sensitivity/mode and operating frequency
- Adapt parameters
- Directional vehicle detection parameters
- Detect LED, switch (call) output, fault LED and disturbance (status) output (can be forced on or off)

Configuration of Canoga 944 Parameters

- Field modem parameters
- Front and rear communication ports
- Programmable card address/password
- Synchronization mode
- State of outputs for fault conditions
- Three types of noise filtering
- Pulse rephrase time

TRAFFIC DATA COLLECTION CONFIGURATION

Data Collection Parameters

- Channel pairs configuration
- Speed and length calculation parameters

Real-time Traffic Data Parameters

- Time periods for real-time data collection
- Event conditions and event pulse output
- Duration of data collection based on memory size limitation

Historical Data Collection Parameters

- Historical data collection time period and duration
- Speed and length vehicle classification parameters
- Duration of data collection based on memory size limitation

PERFORMANCE DIAGNOSTICS AND VERIFICATION

Real-time Activity Monitoring

The real-time activity monitoring application allows a traffic engineer to monitor the activity of the Canoga traffic sensing system in real-time. The following parameters can be monitored:

- Sensor measurements (sensor status, sensor inductance, sensor frequency, reference frequency)
- Last fault or disturbances (type, time and date of occurrence)
- Vehicle sensing information (inductance change, duration, and time and date of detection)
- Vehicle count (count, directional count and time period remaining)
- Synchronization status

PERFORMANCE VERIFICATION REAL-TIME TRAFFIC DATA

Canoga TMC-CS allows the user to observe one of two real-time traffic data displays:

- Date, time and individual vehicle speed and length
- Mean speed, count and occupancy for consecutive, user-defined time periods

The real-time date is displayed for two Canoga 944 channel pairs.

HISTORICAL TRAFFIC DATA

Canoga TMC-CS can display historical traffic data collected for each consecutive time period:

- Mean, count, occupancy and unclassified vehicles for each time period
- Speed classification for each time period (35 classes), if enabled
- Length classification for each time period (six classes), if enabled
- Speed classification by length for each time period, if enabled

The table below shows the binning duration depending on the available memory and on the collected data for a 15-minute binning interval.

	FOUR CHANNELS	
COLLECTED DATA	ONBOARD MEMORY	MEMORY MODULE
Mean Speed, Count and Occupancy	20 days	84 days
Mean Speed, Count and Occupancy and Six Length Classes	4.5 days	18 days

HISTORICAL TRAFFIC DATA RETRIEVAL

Canoga TMC-CS can retrieve all historical traffic data from Canoga traffic monitoring cards. The retrieved data can be saved for later analysis using Microsoft® Excel®, Microsoft® Access™ or another spreadsheet or database software.

Matched Components of the Canoga™ Traffic Sensing System

DIRECTIONAL VEHICLE TRAVEL APPLICATION

Canoga TMC-CS can configure Canoga 944 for detection of vehicle travel direction. Two closely spaced Canoga Microloop sensors (or overlapping inductive loops) are connected to either channels 1 and 2 or 3 and 4. The travel direction of a vehicle is identified by the directional vehicle count and the directional output in either the first or second channel of the pair, depending on the direction of travel.

REAL-TIME TRAFFIC EVENT APPLICATION

Canoga TMC-CS can be configured for the detection and logging of real-time traffic events for each channel pair. A traffic event comprises one or two conditions based on vehicle speed and/or vehicle length. Some examples are:

- Event if vehicle speed is greater than 65 mph (105 km/h) (vehicle is exceeding the speed limit)
- Event if vehicle speed is greater than 65 mph (105 km/h) and vehicle length is greater than 50 feet (15 m) (vehicle is a speeding large truck)
- Event if vehicle length is greater than 35 feet (10.7 m) and vehicle length is less than 45 feet (13.7 m) (vehicle is probably a bus)

BOARD EDGE CONNECTOR TERMINATIONS

PIN	FUNCTION	944	PIN	FUNCTION	944
A	Common Of +24Vdc	•	1	Synchronize Conductor 1	•
B	+24Vdc (+10.8Vdc To 38Vdc)	•	2	Synchronize Conductor 2	•
C	Reset External	•	3	NC	
D	Channel 1 Loop Input A	•	4	Channel 1 Redundant Loop Input A	•
E	Channel 1 Loop Input B	•	5	Channel 1 Redundant Loop Input B	•
F	Channel 1 Switch Output (C)	•	6	NC	
H	Channel 1 Switch Output (E)	•	7	Channel 1 Disturbance Signal (OC)	•
J	Channel 2 Loop Input A	•	8	Channel 2 Redundant Loop Input A	•
K	Channel 2 Loop Input B	•	9	Channel 2 Redundant Loop Input B	•
L	PE (Protective Earth)	•	10	NC	
M	NC		11	NC	
N	NC		12	NC	
P	Channel 3 Loop Input A	•	13	Channel 3 Redundant Loop Input A	•
R	Channel 3 Loop Input B	•	14	Channel 3 Redundant Loop Input B	•
S	Channel 3 Switch Output (C)	•	15	NC	
T	Channel 3 Switch Output (E)	•	16	Channel 3 Disturbance Signal (OC)	•
U	Channel 4 Loop Input A	•	17	Channel 4 Redundant Loop Input A	•
V	Channel 4 Loop Input B	•	18	Channel 4 Redundant Loop Input B	•
W	Channel 2 Switch Output (C)	•	19	EIA-485-A [RS-232 TX (M832 Option)]	•
X	Channel 2 Switch Output (E)	•	20	Channel 2 Disturbance Signal (OC)	•
Y	Channel 4 Switch Output (C)	•	21	EIA-485-A [EA-232 TX (M832 Option)]	•
Z	Channel 1 Switch Output (E)	•	22	Channel 4 Disturbance Signal (OC)	•

• Shaded Means this model has a connection to this pin.

(E) Emitter of Opto-coupler (C) Collector of Opto-coupler (OC) Open Collector/Open Drain NC No Connection
Pins 1 through 22 are on the top (component) side and pins A through Z are on the back (solder side).
Polarization keys are located at three positions: between B/2 and C/3, between M/11 and N/12, between E/5 and F/6.

CANOGA™ 944 TRAFFIC MONITORING CARD OPTIONS

Canoga™ 848 Memory Module

The Canoga™ 848 Memory Module is an optional accessory for Canoga™ 944 Traffic Monitoring Cards. It expands the memory for collection of historical traffic data. This module increases the standard available memory from 16KB to 64KB.

Model 832 Communication Module

The Model 832 Communication Module changes the rear TIA485 port to an TIA232 port. The Model 832 module cannot be used when a Canoga 848 module is installed and vice versa.

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